

University of Bahrain  
College of Information Technology  
Computer Engineering Department  
Semester 2, 2014/2015  
Instructor: Dr. Salman Khan

ITCE 314-Section 1  
Name: .....  
ID: .....  
04 May 2015  
Duration: 1 Hour 15 minutes

**Exam # 2**

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| Question number | Max. Marks | Marks obtained |
|-----------------|------------|----------------|
| Q1              | 10         |                |
| Q2              | 10         |                |
| Q3              | 15         |                |
| Q4              | 10 (5+5)   |                |
| Q5              | 10         |                |
| Total           | 55         |                |

**Instructions:**

- Solve all questions
- For question Q1, **circle** the correct answer. Any other type of marking to indicate the answer will be considered **invalid**.
- Show all your work to claim full credit.

**Q1: Circle the most appropriate answer for each of the following:**

**(10 × 1 marks)**

i) A \_\_\_\_\_ spreads infection by passively receiving object that gets itself executed.

- a. Trojan Horse
- b. Worm**
- c. Virus
- d. Spam

ii) FTP uses port \_\_\_\_\_ for data connection

- a. 20**
- b. 21
- c. 25
- d. 80

iii) HTTP uses the services of \_\_\_\_\_

- a. UDP
- b. IP
- c. TCP**
- d. none of the above

iv) Throughput is defined as \_\_\_\_\_

- a. data transfer rate between sender and receiver**
- b. data transfer rate between two adjacent nodes
- c. data queuing rate between sender and receiver
- d. data queuing rate between two adjacent nodes

v) Which of the following is NOT true for the servers in a client-server model?

- a. They should have permanent IP address
- b. They should have dynamic IP addresses**
- c. They should be always ON
- d. All of the above

vi) During an FTP session, the control connection is opened

- a. exactly once**
- b. at least once
- c. as many times as needed
- d. twice

vii) HTTP is a \_\_\_\_\_ protocol

- a. Peer-to-peer
- b. Hybrid
- c. Client-server**
- d. Hybrid peer

viii) Which of the following is NOT a transport service needed by an application

- a. Data loss consideration
- b. Timing

c. Routing

d. Security

ix) Which one of the following is NOT a component of cookies?

a. cookie header line of HTTP *response* message

b. cookie file kept on user's host, managed by user's browser

c. An object addressable by a URL

d. back-end database at Web site

x) Which of the following is NOT associated with FTP based communication?

a. client authorized over control connection

b. client browses remote directory by sending commands over control connection

c. after transferring one file, server closes data connection

d. client sends requests as soon as it encounters a referenced object

**Q2:** The following table provides some terms and descriptions. Relate the term with its corresponding correct description by providing the correct alphabet in the third column. Note that some descriptions do not match with any term and should be left unanswered.

| Term                 | Description                                               | Correct Answer |
|----------------------|-----------------------------------------------------------|----------------|
| A. Identifier        | Minimal (or no use) of dedicated servers                  | E              |
| B. Trojan Horse      | Infection by receiving object (e.g., e-mail attachment),  | G              |
| C. UDP               | SMTP, HTTP, and FTP                                       | J              |
| D. Wireshark         | IP address and port number                                | A              |
| E. Peer-peer model   | Satisfy client request without involving origin server    | H              |
| F. TCP socket        | Hidden part of some otherwise useful software             | B              |
| G. Virus             | Source IP and port number, Destination IP and port number | F              |
| H. Proxy server      | Connectionless demultiplexing                             | I              |
| I. UDP segment       | Packet sniffing                                           | D              |
| J. Application layer | Best effort service                                       | C              |
|                      | End-to-end resource reservation                           | -              |
|                      | Queuing delay                                             | -              |

**Q3: Answer the following questions**

- (a) Draw the diagram to show the layers (in correct order) in the Internet protocol suite [5 points]
- (b) For the ISO/OSI model, what additional layers are used? [2 points]
- (c) For part (b) above, give one function for each of these layers [3 points]
- (d) For each of the following activities, which layer has primary responsibility? [5 points]
  - I. For communications between one device and the devices directly connected to it? **Link**
  - II. For routing of messages across the Internet? **Network**
  - III. For actual transmission of data bits? **Physical**
  - IV. For arranging the orderly sending and orderly receiving of packets? **Transport**
  - V. For deciding whether to provide reliable or unreliable communication to application data.  
**Transport**

- (a) The diagram should show (from top to bottom): Application, Transport, Network, Link, Physical
- (b) Presentation and Session
- (c) For Presentation: encryption, compression, machine-specific conventions (anyone is enough)  
For Session: synchronization, checkpointing, recovery of data exchange (anyone is enough)
- (d) I. Link
  - II. Network
  - III. Physical
  - IV. Transport
  - V. Transport

**Q4:** A user wishes to download seven equal-sized image files from a web server. Assume the round-trip-time between the user's web browser and the web server is constant at 150 milliseconds (ms). The user fetches the web page consisting of the main HTML file and the seven image files. Ignoring transmission times and computation time on the server, how much time it takes from when the user first clicks to load the page until the web browser has downloaded all seven file from the page, if the protocol in use is:

Answer: There are total of 8 files ( 1 HTML file + 7 image files)

(a) non-persistent HTTP

Requires 2 round trips (RTT) for each object, because TCP connections are not reused.

So we need 8 files = 16 RTT

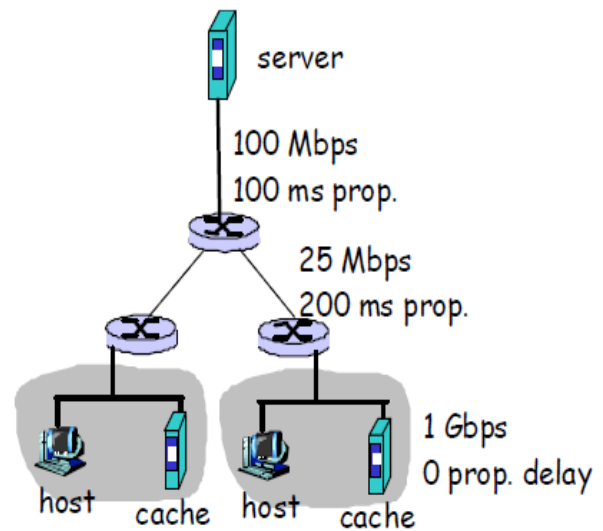
$8 * 150 = 2400 \text{ ms} = 2.4 \text{ seconds}$

(b) persistent HTTP

Requires 1 RTT to establish a TCP connection that will be reused throughout, then 1 RTT for each element of the page. So a total of  $1\text{RTT} + 8\text{RTT} = 9\text{RTT} = 9 * 150 = 1350 \text{ ms} = 1.35 \text{ sec}$

**Q5:**

Consider the scenario in the given figure in which a server (given at the top) is connected to a router by a 100 Mbps link, with a 100 ms propagation delay. That router in turn is connected to two routers, each over a 25 Mbps link with a 200 ms propagation delay. A 1 Gbps link connects a host and a cache (when present) to each of these routers; this link, being a local area network, has a propagation delay that is essentially zero. All packets in the network are 10,000 bits long. What is the end-to-end delay from when a packet is transmitted by the server to when it is received at a host? Assume that cache are not active, that there is no queuing delay at a link, and that the node (router) packet-processing delays are also zero.



*Answer: If all packets at 10,000 bits long, it takes 100 usec to send the packet over a 100Mbps link, 400 usec to send over a 25 Mbps link, and 10 usec to send over a gigabit link. The sum of the three link transmission times is thus 510 usec. The sum of the propagation delays is  $200+100=300$  msec. **Thus the total end-end delay is 300.510 msec or 0.3005 sec.***